

Appn. No. 09/756,451  
Response dated May 24, 2004  
Reply to Office Action of February 25, 2004

## REMARKS

Claims 1-3 and 5-11 are pending in this application. Claim 4 has been canceled. Claim 1 has been amended to particularly point out and distinctly claim what Applicants consider their invention to be; Claim 3 has been amended to depend from Claim 1.

### Response to Rejection under 35 USC 112

Claim 3 has been objected to under 35 USC 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicants regard as their invention. Applicants have amended the claim to depend from Claim 1 and have, thereby, overcome this objection.

### Response to Rejection under 35 USC 102(e)

Claims 1 and 10 are rejected under 35 USC 102(e) as being anticipated by U.S. Patent 6,365,081 (Beck). In particular, the Examiner asserts that Beck shows that is known to carry out a pultrusion process for preparing a continuous fiber-reinforced thermoplastic composite article by continuously pulling the fibers through a process that includes the steps of 1) drawing a fiber bundle continuously through a melt obtained by heating a thermoplastic resin, 2) impregnating the drawn fiber bundle with the melted thermoplastic resin to form a composite melt, 3) drawing the composite melt through a consolidation die to form a thermoformable composite profile, 4) thermoforming the composite profile on-line by which it is curved, twisted, or provided with varied cross-sectional shape along its length, and 5) cooling the shaped composite article to solidify the thermoplastic resin and provide an article that is curved, twisted, or provided with a varied cross-sectional shape along its length. Applicants disagree with the Examiner's contention for the following reasons.

As amended, Claim 1 more precisely describes a pultrusion process that imparts, *along the length* of the composite, a curve, a twist, or varied cross-sectional shape. In contrast, Beck describes co-extruded profiles that do not change *longitudinal* cross-sectional shape: every cross-sectional slice is identical in the Beck reference. The varied cross-section in the composite contemplated by Applicants' invention is accomplished by a thermoforming step carried out after the

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thermoformable profile exits the consolidation die, thereby creating a profile with shape variation in all dimensions. No such step is contemplated by Beck and, for this reason, Beck does not anticipate Claim 1.

Response to Rejection under 35 USC 103(a)

Claims 2, 3, 5, 9, and 11 have been rejected under 35 USC 103(a) as being obvious over Beck in view of US Patent 4,828,775 (Willenberg). In particular, the Examiner asserts Claim 2 is obvious because Willenberg shows that it is known to carry out a pultrusion process wherein the thermoplastic resin includes a depolymerizable and repolymerizable thermoplastic resin having a  $T_g$  of not less than 50° C; Claim 3 is obvious, according to the Examiner, because Willenberg teaches to pass the article through a rotary/caterpillar-type die; Claim 5 is obvious because Willenberg teaches to pass the shaped composite article through a rotating die at elevated temperatures; Claim 9 is obvious because Beck describes a thermoplastic polyurethane; and Claim 11 is obvious because Beck teaches to combine a depolymerizable and repolymerizable polyurethane with polyvinyl chloride. Applicants disagree with the Examiner's rejection for the following reasons.

As stated above, Beck does not teach to change shape after the profile exits the consolidation die. Therefore, Claim 1 is patentable and all claims depending therefrom are also patentable. Claim 2 is further patentable because, contrary to the Examiner's assertion, Willenberg does not teach the use of a depolymerizable and repolymerizable thermoplastic resin having a  $T_g$  of greater than 50° C. The passage in Willenberg that the Examiner cites relates to melting point, not  $T_g$  of a polymer. Second, nowhere does Willenberg describe a polymer that exhibits a decrease of molecular weight upon heating and an increase molecular weight upon cooling.

Claim 5 is patentable since it depends from a patentable claim. The fact that Willenberg contemplates a rotating die is irrelevant since the key feature of thermoforming a profile after exiting the die is not contemplated.

Claim 9 is patentable because it depends from a patentable claim. Moreover, though Beck mentions polyurethane, it does not specifically mention rigid thermoplastic polyurethanes, which are high  $T_g$  resins that depolymerize upon heating

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and repolymerize upon cooling. Since the other resins listed in Beck are elastomers, a person of ordinary skill in the art would know that Beck was referring to low  $T_g$  TPU elastomers, not rigid TPUs. For this additional reason, Claim 9 is unobvious over the cited art.

Claim 11 is patentable because it depends from a patentable claim and because, as noted above, the mere mention of TPUs does not describe the specific high  $T_g$  TPU contemplated by Applicants.

Claim 6 has been rejected as being obvious over Beck in view of US Patent 4,897,230 (Gross). The rejection is improper because Claim 6 depends from a patentable claim and for the further reason that Gross's process entails maintaining consistency of foam thickness, which is unrelated to creating different haul-off rates to fashion longitudinal shaping of a thermoplastic composite. For this additional reason, Claim 6 is patentable.

Claim 7 has been rejected as being obvious over Beck and Gross in further view of US Patent 4,076,570 (Medley et al.). More particularly, the Examiner asserts that Medley et al. discloses a thermoforming process wherein the composite profile is passed through a curved cooling die equipped with internal means that force some of the reinforcing fibers to travel a longer path through the die than other. However, the rejection is improper because no combination of Beck, Gross, and Medley et al. discloses altering the dimension of the profile after it exits the die; moreover, Claim 7 depends from an otherwise allowable claim; for this additional reason, Claim 7 is patentable.

Claim 8 has been rejected as being obvious over Beck in view of US Patent 4,323,533) Bramhall. Here, the Examiner asserts that Bramhall discloses a thermoforming process wherein the thermoforming is carried out by winding a composite profile on a mandrel as the means for pulling the composite through the die, and then cooling the shaped composite to a temperature below the solidification temperature. The rejection is improper because no combination of Beck and Bramhall disclose the step of changing the dimension of the profile along its length. For this reason, Claim 8 is patentable.

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In general, none of the cited references teach alteration of a profile after it emerges from the die. The absence of the disclosure of this critical step renders Claim 1 patentable over the prior art; therefore, Claims 2, 3, and 5-11 are necessarily allowable because they depend from a patentable claim.

For the above-stated reasons, Applicants respectfully request that a Notice of Allowance be granted for Claims 1-3 and 5-11.

Respectfully submitted,



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